

CLAIMS

What is claimed is:

1. A request method for performing optical power management to accomplish planned addition and removal of wavelengths in an optical communications system, each wavelength having a path of transmission through the system, comprising:

communicating a request for a power ramp to at least one path network component in the path;

determining that the path network component has made preparations for the power ramp; and

performing a power ramp in response to said determining.

2. The method of claim 1 further comprises receiving an acknowledgment and determining that the path network component has made preparations for the power ramp based on the acknowledgement.

3. The method of claim 1 further comprises waiting a predetermined amount of time to allow the path network component to make preparations for the power ramp, and determining that the path network component has made preparations for the power ramp based on the elapsed wait time.

4. The method of claim 2 wherein the path network component is adapted to send the acknowledgement subsequent to the preparations.

5. The method of claim 1 wherein the path network component is adapted to make the preparations in response to receiving a request for a power ramp.

6. The method of claim 1 further comprises notifying the path network component of completion of the power ramp.

7. The method of claim 6 further comprises resuming normal operating conditions at the path network component in response to said notifying.

8. The method of claim 1 wherein the step of performing a power ramp further comprises ramping up power input to the optical communication system.

9. The method of claim 1 wherein the step of performing a power ramp further comprises ramping down power input to the optical communication system.

10. The method of claim 1 wherein the step of communicating a request further comprises using a data communications network to connect at least two network components in the optical communication system.

11. The method of claim 1 wherein the step of communicating a request further comprises using an optical supervisory channel to communicate the request.

12. The method of claim 1 wherein the path network component is further defined as an optical amplifier, such that the preparations for the power ramp includes switching from an automatic power control mode to an automatic gain control mode.

13. The method of claim 1 wherein the path network component is further defined as a Raman pump, such that the preparations for the power ramp includes entering a static mode.

14. The method of claim 1 wherein the path network component is further defined as a dynamic gain equalizer, such that the preparations for the power ramp includes at least one of: freezing a current operating state of the dynamic gain equalizer; and ignoring power levels of wavelengths undergoing a power ramp and continuing to equalize power levels of remaining wavelengths that are in service.

15. The method of claim 2 wherein the path network component is adapted to receive a downstream acknowledgment from a downstream network component in the path, the downstream acknowledgement indicating that the downstream network component has made preparations for the power ramp,

wherein the path network component is adapted to send the acknowledgement subsequent to receipt of the downstream acknowledgement,

wherein the path network component is adapted to send the acknowledgment to an upstream network component,

wherein an upstream direction corresponds to a first direction along the path that is toward a source point of the wavelength, and

wherein a downstream direction corresponds to a second direction along the path that is toward a termination point of the wavelength.

16. The method of claim 12, wherein said performing occurs at a rate that allows the optical amplifier to track the change in input power gracefully and maintain constant gain, thereby reducing transient behavior.

17. A network component adapted to accomplish planned addition and removal of wavelengths according to the method of claim 1.

18. An optical communications system adapted to perform addition and removal of wavelengths according to the method of claim 1.

19. A response method for performing power management to accomplish planned addition and removal of wavelengths in an optical communications system, each wavelength having a path of transmission through the system, the method comprising:

- receiving a request for a power ramp;
- making preparations for the power ramp;
- determining that the power ramp has been completed; and
- resuming normal operation in response to said determining.

20. The method of claim 19, the method further comprising sending an acknowledgment, wherein the acknowledgment indicates that preparations for the power ramp have been completed.

21. The method of claim 20, wherein said sending an acknowledgment occurs subsequently to said making preparations.

22. The method of claim 21, wherein said making preparations occurs in response to said receiving a request.

23. The method of claim 19, the method further comprising receiving a notification, said notification indicating completion of the power ramp, wherein said determining is based on said receiving a notification.

24. The method of claim 19, the method further comprising waiting a predetermined amount of time, the predetermined amount of time predetermined as sufficient to allow the power ramp to be completed, wherein said determining is based on said waiting.

25. The method of claim 19, wherein said receiving a request occurs via a data communications network connecting at least two network components of the system.

26. The method of claim 25, wherein said communicating occurs via an optical supervisory channel of the system.

27. The method of claim 19, wherein said making preparations is performed by an optical amplifier, and wherein said making preparations corresponds to switching from an automatic power control mode to an automatic gain control mode.

28. The method of claim 19, wherein said making preparations is performed by a Raman pump, and wherein said making preparations corresponds to entering a static mode.

29. The method of claim 19, wherein said making preparations is performed by a dynamic gain equalizer, and wherein said making preparations corresponds to at least one of:

- a) freezing a current operating state of the dynamic gain equalizer; and
- b) ignoring power levels of wavelengths undergoing a power ramp, and continuing to equalize power levels of remaining wavelengths that are in service.

30. The method of claim 20, the method further comprising receiving at least one downstream acknowledgment from an adjacent, downstream network component, the downstream acknowledgement indicating that the downstream network component has made preparations for the power ramp,

wherein said sending occurs subsequent to said receiving at least one downstream acknowledgment.

31. The method of claim 30, wherein said sending corresponds to sending the acknowledgement to an adjacent, upstream network component.

32. The method of claim 30, wherein said receiving at least one downstream acknowledgment corresponds to receiving downstream acknowledgements at different levels according to transmission hierarchy layers of the system.

33. A network component adapted to accomplish planned addition and removal of wavelengths according to the method of claim 19.

34. An optical communications system adapted to perform power management to accomplish addition and deletion of wavelengths according to the method of claim 19.

35. An optical communications system operable to perform power management to accomplish planned addition and removal of wavelengths, each wavelength having a path of transmission through the system, the system comprising:

a first network component adapted to communicate a request for a power ramp downstream, to receive an acknowledgement from downstream, to perform the power ramp in response to receipt of the acknowledgment, and to send a notification downstream subsequent to performance of the power ramp, wherein the notification indicates that the power ramp has been completed; and

a second network component in communication with and downstream from said first network component, the second network component adapted to receive the request from upstream, to make preparations for the power ramp, to send the acknowledgement upstream subsequent to the preparations, wherein the acknowledgment indicates that said second network component has made preparations for the power ramp, to receive the notification from upstream, and to resume normal operations in response to receipt of the notification.

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